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for

METHOD AND APPARATUS FOR LONG-RANGE PLANNING

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METHOD AND APPARATUS FOR LONG-RANGE PLANNING

RELATED APPLICATIONS

This patent application claims priority from United States Provisional Patent Application Serial No. 60/281,052, entitled The Long Range Planner Software Product, filed April 2, 2001.

FIELD OF THE INVENTION

The invention is in the field of software tools that predict the effect of proposed long-range plans on complex systems.

BACKGROUND

Managers and administrators of many types of complex systems routinely try to produce long-range plans for the enterprise. An effective long-range plan should predict future conditions, the types of ongoing actions needed to meet those conditions, and the costs and relative effectiveness of the ongoing actions. One objective of an effective long-range plan is to reduce the expenditure of time and money by an enterprise while maximizing efficiency and profit. One example of a complex system is a consulting enterprise that performs many types of work for many types of client using many types of employees. Significant long-range planning challenges for a consulting enterprise include predicting work loads and types of work loads, and predicting hiring and training needs.

A contact center is a complex system that provides a good example of the requirements for effective long-range planning. A contact center is an organization that responds to incoming contacts from customers of an enterprise. The incoming contacts are via any one of a number of contact media, such as telephone calls, email, fax, web chat, voice over internet protocol, and call backs. An agent is an employee that is trained to respond to various contacts according to both the content and the medium of the contact. Each agent can have a different skill set. For example, one agent may be trained to answer live telephone help inquiries regarding certain products, respond to email regarding certain products, receive telephone purchase orders for certain products, etc. Typically, incoming contacts are assigned to different queues based upon the content and/or medium of the contact. In embodiments of the invention, contact queues are divided into at least two types of queues. For example, one type of queue is an immediate queue for contacts that can be abandoned and should be responded to in real-time, such as telephone calls. Another type of queue is a deferred queue for contacts that cannot be abandoned (at least not immediately) and should be responded to within some time period after receipt, such as email or fax. Queues may be defined in any other way, such as by the required level of service on a particular queue, where a common measure of service level is a percentage of calls answered within a defined time period. An agent may be assigned to multiple queues within a time period. A queue typically handles one type of contact requiring a particular skill or skills. The possible number of agent skill sets includes every permutation of combinations of the existing skills in the organization. Each agent has a particular skill set, but the skill sets among different agents may overlap.

Enterprises operating contact centers must schedule agents carefully in order to provide a required level of service on each queue at the lowest overall cost. A poor schedule could leave many calls unanswered, or leave many paid agents idle. Existing scheduling and

forecasting tools are designed to create work schedules for the agents currently available. Schedules are typically created for no more than four weeks in advance. Existing scheduling and forecasting tools account for such specifics as a particular agent's vacations, proficiency and availability. The scheduling tools attempt to maximize service level by intelligently scheduling available agents. Existing scheduling tools, however, do not provide guidance for long-range planning. Scheduling tools guide day-to-day staffing decisions given a fixed set of resources, but do not help an administrator intelligently plan future hiring and training decisions. For example, scheduling tools do not allow an administrator to see the effects of scheduling, hiring, and training decisions on queue service levels or costs.

To conduct long-term planning with traditional scheduling tools, users typically create a "virtual week" far in the future, and add artificial agents to a schedule. Scheduling is then performed, while varying parameters to conduct "what-if" studies. This approach is inadequate for accurate long-range planning for several reasons. For example, the period of time available for scheduling is too short to be of use for long-range planning. This is a fundamental inadequacy, in that long-term planning spans several months, rather than the two to four weeks available with current tools. This leads to inaccurate results, in part because seasonal and yearly variations cannot be captured by the tool. A direct result of this temporal mismatch is that long-term hiring plans and training plans cannot be created using the traditional approach to long-term planning. Therefore, traditional scheduling and forecasting approaches at their best are only usable for estimating staff hours required, but are not usable for the creation of hiring and training plans.

Another reason traditional scheduling approaches are inadequate for accurate long-range planning is that they are unnecessarily time-consuming. One of the reasons for this is that traditional tools deal with atomic temporal units ranging from five minutes to fifteen

minutes. This is too fine-grained for conducting long-term planning and, as a result, the scheduling engine, which is busy identifying artificial agents' starting and ending shift times with fifteen minute precision, is unnecessarily slow. Another reason is that traditional tools include parameters that are insignificant in the creation of long-term plans, yet the user is forced to specify these parameters and thus waste time while conducting long-term planning. Examples of such parameters include the specific distribution of breaks in a particular shift, unnecessarily precise information regarding an agent's unavailability, proficiency and shift preferences, etc.

Yet another reason traditional scheduling approaches are inadequate for accurate long-range planning is that they provide no scheduling-free solution to the problem of computing performance. In the case of skill-based contact centers, there is no traditional system that can estimate the performance of the contact center based on total headcount numbers without launching into a complete scheduling session, in which agents are scheduled and the resulting schedule's performance is measured. This is time-consuming and inefficient. Also, because the performance that is measured is over a short period, traditional scheduling methods probably generate inaccurate performance measurements of long-range staffing plans.

There are existing long-term forecasting tools which are used to estimate the volume of calls or contacts that will be expected months and years into the future. These are trend analysis tools, in that they enable the user to incorporate prior historical data in the exercise of creating seasonal, monthly, weekly and daily trends. Once these trends have been created, they are applied forward in time based on current contact or call statistics to yield estimates of incoming call volumes for future months over a long term. Although this process can successfully estimate future call volumes, the long term forecasting tool is inadequate for

more complete long-term planning for several reasons. One reason is that long-term forecasting provides no estimate of staffing hours required, especially in a skills-based environment. Another reason long-term forecasting is inadequate for more complete long-term planning is that existing long-term forecasting tools provide no estimate of performance (such as service level and queue occupancy) given headcount. Another inadequacy is that existing long-term forecasting has no mechanism for constructing hiring or training plans. Yet another inadequacy is that long-term forecasting has no mechanism to enable the user to assess the impact of making structural changes to the contact center (e.g. splitting a queue or adding a queue).

SUMMARY OF THE DISCLOSURE

A method and apparatus for long-range planning are described. One application of the method and apparatus is long-range planning for staffing in a complex environment, such as a contact center. One embodiment of long-range planning in a contact center provides easy visualization of the effects of a proposed long-range plan. For example, consequences of strategic decisions regarding changes to head count, training, contact volume and other contact center statistics can be easily viewed. The long-range planning includes a user interface that receives information that defines decisions regarding a proposed long-range plan, and transparently operates on the information received using particular algorithms. The long-range planning quickly determines the impact of each decision on contact center performance, including service levels per type of work load. In a call center context a work load can be a queue, and the long-range planning determines service level per queue and agent occupancy per queue. Functionality of the long-range planning for a call center includes: long-range forecasting; headcount planning; contact center statistics forecasting; training planning; cost modeling; cost-of-plan calculation; skill-based planning; multi-contact planning; a what-if comparison tool; a plan-based editor; an Excel™-based reporting; a point of view (POV) customization; localization-based customization of fields; a plan creation Wizard; and an intelligent advisor.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 is a block diagram of an embodiment of a system for multi-contact schedule generation.

Figure 2 is a user interface screen of an embodiment.

Figure 3 is a block diagram of a part of an embodiment of a discrete long-range planner.

Figure 4 is a block diagram of a part of an embodiment of a discrete long-range planner.

Figure 5 is a block diagram of an embodiment of a cost model.

Figure 6 is an illustration of a user interface screen for choosing fields to be displayed.

Figure 7 is an illustration of a user interface screen for choosing fields to be displayed.

Figure 8 is an illustration of a user interface screen that allows tabbing between different scenarios.

Figure 9 is an illustration of a user interface screen that allows tabbing between different scenarios.

Figure 10 is an illustration of a user interface screen that shows interleaved column grids from different scenarios.

Figure 11 is an illustration of a user interface screen that shows interleaved row grids from different scenarios.

Figure 12 is an illustration of a user interface screen including a graph application.

Figure 13 is an illustration of a user interface screen including a graph application.

Figure 14 is an illustration of a user interface screen including a performance summary report.

Figure 15 is an illustration of a user interface screen for creating a cost model in one embodiment.

Figure 16 is an illustration of a user interface screen for creating a cost model in one embodiment.

Figure 17 is an illustration of a user interface screen for creating a cost model in one embodiment.

Figure 18 is an illustration of a user interface screen for creating a profile in one embodiment.

Figure 19 is an illustration of a user interface screen for creating a profile in one embodiment.

Figure 20 is an illustration of a user interface screen for creating a queue in one embodiment.

Figure 21 is an illustration of a user interface screen of a Wizard process in one embodiment.

DETAILED DESCRIPTION

A method and apparatus for long-range planning are described. The method and apparatus are applicable to any complex system that allocates various resources to various work loads. One embodiment is a method for generating the effects of proposed long-range plans on a contact center that handles multiple queues and multiple contact media. The method takes as input a variety of information about a proposed long-range plan. The information includes multiple employee (employee and "agent" will be used interchangeably herein) profiles, expected call volumes per queue, average handling times per queue, required hours per queue, and required service levels per queue. Employees can have any combination of skills. For example, employees may be skilled in handling one or more types of queues and/or one or more types of contact media. The method produces a detailed report of the effects of the proposed long-range plan, including "actual" service levels per queue and "actual" capacity hours. The method further produces cost forecasts based on the input information, including an effective cost per hour and projected training costs.

Figure 1 is an embodiment of a system 100 for long-range planning. The system includes multiple client computers 102-105, which are coupled to the server 106 through a network 108. The network 108 can be any network, such as a local area network, a wide area network, or the Internet. The client computers each include one or more processors and one or more storage devices. Each of the client computers also includes a display device, and one or more input devices. The server 106 includes one or more storage devices. All of the storage devices store various data and software programs. In one embodiment, methods for long-range planning are carried out on the system 100 by software instructions executing on one or more of the client computers 102-105. The software instructions may be stored on the server 106 or on any one of the client computers. For example, one embodiment is a hosted

application used by a contact center of an enterprise that requires long-range staffing planning for many employees, or agents. The software instructions are stored on the server and accessed through the network by a client computer operated by the enterprise. In other embodiments, the software instructions may be stored and executed on the client computer. Data required for the execution of the software instructions can be entered by a user of the client computer through a specialized user interface. Data required for the execution of the software instructions can also be accessed via the network and can be stored anywhere on the network.

The long-range planning method and apparatus include various functions accessible through a user interface as described below. One of the functions is preliminary long-range plan design, including payroll planning. The hiring strategy and training strategy for a contact center is planned for a coming year, and the impact of decisions on contact center performance and payroll costs are viewed. This requires a temporal horizon of up to 3 years. This process includes creation of a long-range forecast, computation of the required future headcount and planning hiring and training to achieve the best possible headcount subject to payroll constraints.

"What-if" structural and non-structural evaluations are also accessible functions. "What-if" evaluations facilitate the consideration of both major and minor changes to next year's plan, including changing the distribution of agent skills, changing the outsourcing model, altering the training program, etc. "What-if" evaluations allow the impact of possible changes on head count needs, quality of service and cost to be viewed.

Another accessible function allows an administrator to intelligently strategize call center changes, particularly in compensation areas such as hiring plans and training plans. The user enters planned projections, and can view the deviations of a proposed plan from

those projections. The user makes changes on portions of the plan based on new information and views the impact of these corrections. There are simple work-flows for making the same change to multiple plans that have temporal intersection with one another.

The user may make a skill-based representation of a strategic plan. In one embodiment, the long-range planner operates in a skills-based setting. Contact statistics such as volume, average handling time (AHT), and service goals are viewed and edited on a queue-by-queue basis. Hiring and training are visualized based on skill set-based groupings of agents. Multi-contact functionality is also available. Each queue can be annotated as a standard phone or chat queue, or alternatively as a deferred queue (e.g., e-mail or fax).

In one embodiment, the temporal granularity of long-range planning is monthly. When creating or modifying a plan, the user defines a period of time, in months, for planning. There is no reason for artificial bounds to be placed on the maximum size of this time period. The long-range planner can be used to view the effects of proposed one year plans, or three to five year plans.

Long-range forecast generation is possible, such as monthly incoming volume forecasts specifiable on a queue-by-queue basis given AHT. Multiple sources of information are generally collected in the creation of a long-range forecast (e.g. marketing input, historical data, and executive goals). Optionally, the user interface facilitates the fusion of data from multiple sources, with clear pointers back to the sources via text explanations. Trend-based forward forecasts, profile acquisition, and raw value acquisition using historical data are available functions.

Variations (e.g. spikes in call volume) are justified by special events such as holidays or catalog drops or marketing product introductions. For such variations, a tool for creating events and clearly labeling the cause of each such event is available.

For headcount planning and need calculation, the user specifies a variety of aspects of planned and unplanned shrinkage and inefficiency (e.g. absenteeism, recurrent training, vacation, etc.). In addition, the user specifies overall work hours of a full-time agent. Based on these values, the service goals and the volume forecast, an estimate of the staffing hours need on a per-queue basis is produced.

Actual staffing hours are calculated based on an attrition specification, a hiring plan specification, a training specification, and skills. The attrition specification allows a separate attrition rate for hires and for live agents.

A training specification can be as simple as the amount of core training time required to take a new hire live. Training plan specification includes estimates of incoming headcount and outgoing headcount. Outgoing headcount refers to individuals leaving a skill group/staff profile to begin training for work in another staff profile. All headcount values are be viewed on a staffing-profile-specific basis. In one embodiment, a staffing profile, or profile, is a group of hypothetical agents that share the same set of skills. A profile could be defined in other ways as necessary, for example, as a group of hypothetical agents that have the same associated costs.

Performance estimates are provided on a queue-by-queue basis by showing the disparity between staffing hours need and staffing hours achieved as well as the expected service level and profile-by-profile occupancy.

Cost computation and reporting capabilities are provided. Cost estimates are possible using a computation of actual cost per scheduled staff hour. This computation is based upon payroll wage distribution, payroll burden and the proportion of hours paid to hours worked (computed based on specified values of unpaid absenteeism, planned shrinkage, paid absenteeism and holidays). Actual cost per schedule staff hour is computed, as well as

burden proportion and work cost (hours paid/ hours worked ratio, or "paid/work ratio"). Specificity at the level of each group is allowed so that characteristics such as for example, training due to shrinkage, can vary among groups. A final budget visualization shows these variable costs and allows for inclusion of multiple user-defined rows to contain one-time and miscellaneous costs that are added directly to the computed values. The budget computation allows changes to the budget model mid-year in a single plan. Examples are allowing a planned salary increase in average per-head loaded cost, or a planned training for a product's new version release.

Inter-plan copy/paste functionality is also provided. Users will frequently transfer data from one plan to another. Entire segments of data, for instance, subsets of volume forecast and hiring plans, have copy/paste functionality. The copy/paste functionality is not only across queues and staffing profiles, but also across plans.

Users of the long-range planner vary from a call center manager to a director to a vice president. Activities or processes are provided for both limiting visibility to the appropriate data and for guiding actions to an appropriate best use of the long-range planner. A generic view tool enables visibility or suppression of any rows or columns of data in order to focus user attention on the desired data.

One embodiment includes a "Wizard" accessible to the user through the user interface. The Wizard interacts with the user to guide the user through many of the functions of the long-range planner. A series of work-flows covering all of the major available activities of the long-range planner provide best practice approaches for each individual activity. The Wizard provides direct hyperlinks with continuation into the long-range planner. In complex parametric cases, the Wizard offers an alternative to filling out complex information directly. Instead, the Wizard offers a questionnaire; when the user completes the

questionnaire the appropriate grid parameters are automatically specified. The activities that are implemented as part of the Wizard system include: configuration/setup; creation of cost model; calculation of accurate shrinkage; estimation of schedule efficiency; adding new queue; adding new agent profile; creating hiring plan; what-if; optimizing the contact center, including reducing costs; lowering AHT, including training and mentoring; cross-skilling agents strategically; increasing schedule efficiency; conducting sensitivity analyses, including identifying downsides; contacting volume forecast; agent shrinkage sensitivity; agent proficiency; anticipating new events; specifying need-spiking events; compensating with agent shrinkage; and planning part-time help.

For a subset of the activities, an "intelligent advisor" begins with a questionnaire, then searches over possible long-range plans to effectively experiment with thousands of what-if scenarios in a matter of seconds. The intelligent advisor returns a set of recommended alternatives for improving contact center performance, resonant with the chosen activity. Some of the intelligent advisor activities are as follows: given demand and goals, construct a hiring plan; in a skilled environment, construct a cross-training plan; in a skilled environment, recommend optimal skill sets (profiles); and conduct a sensitivity analysis/risk assessment evaluation of the contact center.

One embodiment of the long-range planner includes an event planner with which a user is able to define an event, with temporal specification. Thereafter, the user specifies the impact of the event on the contact center in terms of contact center statistics, such as volume forecast ramps or AHT spikes, as well as agent statistics such as training, shrinkage, and temporary changes. The user is notified of the event in the long-range plan and is able to conduct cost impact and service level impact studies by moving the event to different months.

The user interface of the long-range planner is compatible with many existing, common software tools, such as Excel™. For example, users can conveniently import data from Excel™ to the long-range planner. Data in an internal representation can be exported to other tools, such as Excel™.

As shown in **Figure 2**, the main interface 200 of one embodiment consists of sets of grids in a central screen area. Three panes 204, 206, and 208 are positioned in a large column, with a fourth menu pane 202 to the left of the column. The top pane 204 contains a set of grids, one for each queue in the purview of the user's contact center(s). In one embodiment, a queue is defined as a stream of contacts. Through the grouping of various call types into various queues, the user identifies physically or logically separate loads upon the contact center. Each queue grid includes temporally indexed information on the following statistics: contact volume; percentage of volume distribution; average handling time; actual service level expected; required staff hours; and capacity staff hours. In addition, each queue has both a queue type and service goals that are set by the user.

The middle pane 206 contains a set of grids, one for each profile in the purview of the user's contact center(s). A profile is a collection of abstract agents that all share the same set of skills. Profiles are not necessarily unique. Each profile grid includes temporally indexed information on the following statistics: number hired; number in training; number transferred in from other profiles; number transferred out to other profiles; total head count; expected occupancy; and shrinkage rate. In addition, each profile has associated with it a set of skills or queues, an average wage and proficiency, and a breakout of the sources of shrinkage for members of the profile (e.g. unpaid absenteeism, paid shrinkage such as jury duty, etc.).

The lower pane 208 contains a single grid that summarizes a number of statistics in a temporally indexed fashion. The statistics include total contact volume, total number of hires, total head count, total staff hours, total cost, and total cumulative cost.

The left-most pane 202 contains folders of functionality, providing various tools within the folders. "Views" provides the ability to change views, selectively hiding and displaying arbitrary rows for all grids in the long-range planner. "Queues" provides the ability to edit Queue properties directly. "Profile" provides the ability to edit profile properties directly. "Wizards" provides the ability to launch Wizards that provide configuration support as well as intelligent advisors that guide the user through analytical best-practices in reducing contact center cost and increasing efficiency. "Events" provides the ability to annotate events and capture side effects of those events on contact center statistics.

Various functions of the long-range planner are implemented using various algorithms that will be described below. One function is an automated headcount and training forward calculator. The automated headcount and training forward calculator allows the user to instantly view the consequences of their hiring, training and transfer decisions on future head count. In one embodiment, the implementation is Java code that is triggered whenever the user makes changes to any of the following parameters of a long-range plan: the number of agents to be hired in a month; the attrition rate for one or more months; the number of agents that will transfer into or out of a profile; the initial headcount forecast going into the plan; and the amount of training time required to convert a newly hired or trained individual into a productive agent. When any such change is made, Java code carries forth a re-calculation of expected headcount throughout the rest of the plan for all affected profiles. This re-calculation is a mathematical formula involving summation based on all incoming agents to

all profiles and subtraction based on all outgoing agents from all profiles. Training time is represented as a delay between the hiring of an agent and their addition to the effective head count.

The staff hours need calculator is another function. On a queue-by-queue and month-by-month basis, the staff hours need calculator computes the required number of staff hours in order to meet service level goals specified in the interface. This calculation has one further input: the distribution of contact volume over the course of an average day. The method described can be generalized to a greater or lesser resolution of distribution information including, for instance, distribution information for each week of a month and for each month in a year. The algorithm that computes staffing hours need begins with calculation of the number of Erlangs required for each time interval in order to satisfy demand within predetermined service goals. The resolution of this Erlang need calculation is tied directly to the resolution with which distribution information has been specified.

Given required Erlangs for all time intervals, summation of these Erlangs yields an estimate of total Erlangs and therefore total staff hours required for the entire planned demand. A discount factor may be used to denote relaxation of demand when local demand peaks are sharp and, therefore, induce high inefficiency if the demand is to be met perfectly.

Another function is a discrete long-range simulator that determines the total number of effective staffing hours of capacity provided for each queue and each time interval, based on the hiring and training plans specified to the long-range planner, along with the queue-by-queue load specified to the long-range planner. The expected service level for each queue and the predicted occupancy for each queue are also determined for each profile, where occupancy is the number of agents servicing a queue. In one embodiment, with reference to **Figure 3**, the discrete long-range simulator stores and updates values for both profiles and

queues, in alternation. For each profile 302 and for each queue 308, a scaling factor 304 and an Erlang by queue (eBQ) factor 306 are stored and updated. Both scaling factor 304 and eBQ factor 306 are arrays of length "numQueues".

For each queue 308, a load_remaining 310 and a net_staffing 312 are stored and updated. Load_ remaining 310 and net_staffing 312 are doubles. To calculate the service levels for each queue, iterative calculation is performed as described below and shown in **Figure 4**. "Redistribute Erlangs" 402 and "recalculate load remaining" 404 are each executed iteratively until the work of agents from all profiles is distributed 406. When all of the work is distributed, a service level for each queue is output 408.

Redistribute Erlangs 402 updates the information stored for each profile. Initially, the load remaining for each queue is set to the load, and this is used to initially redistribute the Erlangs. This occurs as follows:

(1)For each profile, set the scaling for each queue(q) to 1.0 - alpha^i)*previous_scaling + alpha^i (q.bunching * q.load_remaining);

(2) Normalize scaling[]

(3) set eBQ[q] = scaling[q]*erlangsToContributeForThisProfile

ErlangsToContribute is headcount*hoursPerMonth * eTC(nq) where nq is the number of queues worked by this profile and eTC is a lookup table transforming, for each possible number of queues, a real-valued number between 0.0 and infinity representing the total effective Erlangs of work performed by a single agent. Previous_scaling is initialized to 0.0. Recalculate load remaining recalculates how much work is left to do. On a per queue basis, this occurs as follows:

For each queue (q)

net_staffing = \sum_profiles(p) p.eBQ[q];

localPCA = calculatePCA(net_staffing, seff, callRate, AHT, goalSeconds); load_remaining = [callVolume - (localPCA*callVolume)]*AHT;

At the completion of this iterative process, expected service levels have been computed for each queue, and the work of each profile's agents has been distributed accordingly. In order to compute occupancy, a second algorithm is then used as follows:

For each profile, set load to zero. Then, loop over each queue that the profile can answer and add the following to load:

percentage of netstaffing for this queue from this profile * load for this queue.

Set occupancy = load/headcount*hoursPerMonth

Then, bound occ by 1.0 above and by the highest occupancy on any of the queues (where occ is load/net_staffing) below.

Another function of the long-range planner is a cost model. In one embodiment, the cost model is an interface that enables accurate prediction of contact center run cost using the inputs and calculations as described below and shown in **Figure 5**. For each profile 502, the interface requests the user to specify shrinkage 504 in a series of categories as percentages of total time. One main category is planned shrinkage, which includes vacations, breaks, training, non-contact tasks, and other fields. The second main category is absenteeism.

Absenteeism has subcategories, such as unpaid absenteeism, which includes fields such as unpaid sick time, unpaid personal time, and other fields. Another subcategory, paid absenteeism, includes the fields jury, FMLA, and other fields. An algorithm computes the total unpaid absenteeism, denoted as "u", and the total shrinkage, which consists of a sum of the planned shrinkage and the unpaid and paid absenteeism.

In addition, the interface allows the user to specify an hourly wage on a profile-by-profile basis. Finally, the interface allows the user to specify the total number of holiday days with varying degrees of temporal resolution, including monthly and yearly. Yet another aspect of the interface allows the user to specify burden in a field-by-field manner. Burden, or overhead, is specified as percentages, similar to shrinkage, for fields including 401K; insurance, worker's compensation, FUTA and other fields.

The algorithm computes Paid/Work Ratio for each profile as:

$$((1 - u) / (1 - \text{total shrinkage} - \text{holidays}))$$

The Paid/Work Ratio is multiplied by the wage to yield the effective cost of each scheduled hour 510, which is one output of the cost model calculator. A further output, the estimated total cost of a long-range plan 512, is computed by multiplying the effective cost of each scheduled hour 510 by the total hours of work on a profile-by-profile basis.

Figures 6 and **7** show user interface screens that allow the user to choose fields to be displayed. The fields available include various queue fields (base contact volume, contact volume, percent volume, etc.), various profile fields, and various "total" fields. In Figure 7, all fields are selected, and the three "show all" boxes are checked. Figure 8 shows that when the user deselects some of the fields, the appropriate "show all" fields boxes are automatically updated.

Another function of the long-range planner is a comparator display that facilitates the use of data generated by the long-range planner. In order to enable what-if workflow, in which the user wishes to visually compare multiple long-range plan alternatives, one embodiment of a user interface includes tabs for viewing two long-range planner scenarios alternately. **Figure 8** shows a user interface screen with tabs. The scenario corresponding to the left tab is displayed. **Figure 9** shows a user interface screen in which the "new scenario" corresponding to the right tab is displayed.

In another embodiment, the comparator display includes a method for comparing multiple grids that have similar dimensionality on a single screen. Using column-major or row-major viewing formats, as indicated by the user, the comparator display interleaves any number of grids so that each Nth row or, alternatively, each Nth column of the resulting merged grid represents data from the Nth long-range plan alternative. In this manner, the user can compare multiple columns or rows of data from a single viewpoint. **Figure 10** shows a display with interleaved column grids, and **Figure 11** shows a display with interleaved row grids.

Variation in color and font are used to facilitate the user's discrimination of information from a first plan X with information from a second plan Y. In addition, a simple threshold-based or statistically-based comparator can identify pairs of comparable information that are particularly different, and these values are colored and emphasized graphically so that they are particularly easy to recognize.

The comparator display can be used in any system. In particular, interleaving of columns or rows has general usefulness in the comparison of any set of grids, or arrays, with like semantics on some or all columns or rows.

Figures 12 and **13** illustrate a graphing capability available in an embodiment of the user interface. **Figure 12** shows the tabbed user interface screen in the background and a graph pop-up in the foreground. The user may select an attribute to graph and a scenario or scenarios to include in the graph. **Figure 13** shows the background screen of Figure 12 with a pop-up with the resultant graph. The graph shows contact volume for a chosen queue.

Figure 14 is a user interface illustrating an aspect of the reporting capability available in an embodiment that coordinates with Excel™ to produce sophisticated, easy to read reports that include data produced by the long-range planner.

An interactive, intelligent Wizard is provided in one embodiment. As shown in **Figure 2,** Wizards are accessible to the user through the menu pane 202 of the main interface 200. The Wizards interacts with the user to guide the user through many of the functions of the long-range planner. A series of work-flows covering all of the major available activities of the long-range planner provide handheld best practices approaches for each individual activity. The Wizard provides direct hyperlinks with continuation into the long-range planner. In complex parametric cases, the Wizard offers an alternative to filling out complex information directly. Instead, the Wizard offers a questionnaire; when the user completes the questionnaire the appropriate grid parameters are automatically specified. As shown in **Figure 2,** some of the activities available through the Wizards are creating a cost model, calculating accurate shrinkage, creating/adding a new agent profile, and creating/adding a new queue.

Figures 15-21 illustrate interactions with the Wizards. **Figures 15-20** illustrate interactions with configuration Wizards. **Figures 15-17** illustrate creating a cost model. **Figure 15** shows an average wage screen in which the user can enter average wages for different agent profiles. **Figure 16** shows a burden screen in which the user can enter

numbers reflecting the financial burden associated with agents. **Figure 17** shows a summary screen for the cost model, which displays cost data, all agent profiles together.

Figures 18 and **19** illustrate creating a new agent profile. **Figure 18** shows a general screen which allows the user to specify, on an agent profile basis, data such as agent efficiency, full time equivalent hours per month, hourly wage, initial headcount, and whether the profile can be hired into or transferred out of. **Figure 19** shows a shrinkage screen. The user can specify that the data entered relates to shrinkage per month or shrinkage for an entire long-range planning scenario. Percentages for planned shrinkage, unpaid absenteeism, and paid absenteeism can be entered. A total shrinkage number is generated for the profile.

Figure 20 illustrates creating a new queue. The user specifies a queue name and abbreviation, a queue type (such as voice or email), and a service goal.

Figure 21 illustrates an interaction with a Wizard that leads the user through steps to achieve a long-range plan objective of improving service levels. **Figure 21** shows a screen of a strategic cross-training Wizard process. On the left of the screen, the steps that will be followed are listed. The first step is identifying queues with the most need for cross-training. On the right of the screen, the Wizard is leading the user through the first step. The queues with the most need can be identified by examining all of the queues and identifying the ones with the worst service. The Wizard accesses the long-range planner to display the appropriate information, in this case, the performance percentages for the queues. The Wizard explains that the worst queues should be selected as candidates for cross-training. With Wizards, the user can develop a training plan and perform long-range planning to see the effects of the training. Thus the user has the capability to quickly and easily target performance problems and develop and test potential solutions through long-range planning.

A method and apparatus for long-range planning have been described with reference to particular embodiments and examples. Various modifications in approach and application are possible without departing from the spirit and scope of the invention, which is defined by the following claims.